

CLAIMS

What is claimed is:

1. An isolated polynucleotide comprising a first nucleotide sequence encoding a polypeptide of at least 200 amino acids that has at least 93% identity based on the Clustal method of alignment when compared to a polypeptide selected from the group consisting of a 1-deoxy-D-xylulose 5-phosphate reductoisomerase polypeptide of SEQ ID NOs:2, 4, 6, 8, 10, 12, 14, 16, 18, and 20, or a second nucleotide sequence that is complementary to the first nucleotide sequence.
2. The isolated nucleic acid fragment of Claim 1 wherein the first nucleotide sequence consists of a nucleic acid sequence selected from the group consisting of SEQ ID NOs:1, 3, 5, 7, 9, 11, 13, 15, 17, and 19, that codes for the polypeptide selected from the group consisting of SEQ ID NOs:2, 4, 6, 8, 10, 12, 14, 16, 18, and 20.
3. The isolated polynucleotide of Claim 1 wherein the nucleotide sequences are DNA.
4. The isolated polynucleotide of Claim 1 wherein the nucleotide sequences are RNA.
5. A chimeric gene comprising the isolated polynucleotide of Claim 1 operably linked to suitable regulatory sequences.
6. An isolated host cell comprising the chimeric gene of Claim 5.
7. An isolated host cell comprising an isolated polynucleotide of Claim 1 or Claim 3.
8. The isolated host cell of Claim 7 wherein the isolated host selected from the group consisting of yeast, bacteria, plant, and virus.
9. A virus comprising the isolated polynucleotide of Claim 1.
10. A composition consisting of a polypeptide of at least 200 amino acids that has at least 93% identity based on the Clustal method of alignment when compared to a polypeptide selected from the group consisting of a 1-deoxy-D-xylulose 5-phosphate reductoisomerase polypeptide of SEQ ID NOs:2, 4, 6, 8, 10, 12, 14, 16, 18, and 20.
11. A method of selecting an isolated polynucleotide that affects the level of expression of a 1-deoxy-D-xylulose 5-phosphate reductoisomerase polypeptide in a host cell, the method comprising the steps of:
 - (a) constructing an isolated polynucleotide comprising a nucleotide sequence of at least one of 30 contiguous nucleotides derived from a nucleotide sequence selected from the group consisting of SEQ ID NOs:1, 3, 5, 7, 9, 11, 13, 15, 17, 19, and the complement of such nucleotide sequences;
 - (b) introducing the isolated polynucleotide into a host cell;
 - (c) measuring the level of a polypeptide in the host cell containing the polynucleotide; and

(d) comparing the level of polypeptide in the host cell containing the isolated polynucleotide with the level of polypeptide in a host cell that does not contain the isolated polynucleotide.

13. The method of Claim 12 wherein the isolated polynucleotide consists of a nucleotide sequence selected from the group consisting of SEQ ID NOs:1, 3, 5, 7, 9, 11, 13, 15, 17, and 19 that codes for the polypeptide selected from the group consisting of SEQ ID NOs:2, 4, 6, 8, 10, 12, 14, 16, 18, and 20.

14. A method of selecting an isolated polynucleotide that affects the level of expression of a 1-deoxy-D-xylulose 5-phosphate reductoisomerase polypeptide in a host cell, the method comprising the steps of:

- (a) constructing an isolated polynucleotide of Claim 1;
- (b) introducing the isolated polynucleotide into a host cell;
- (c) measuring the level of polypeptide in the host cell containing the polynucleotide; and
- (d) comparing the level of polypeptide in the host cell containing the isolated polynucleotide with the level of polypeptide in a host cell that does not contain the polynucleotide.

15. A method of obtaining a nucleic acid fragment encoding a 1-deoxy-D-xylulose 5-phosphate reductoisomerase polypeptide comprising the steps of:

(a) synthesizing an oligonucleotide primer comprising a nucleotide sequence of at least one of 40 contiguous nucleotides derived from a nucleotide sequence selected from the group consisting of SEQ ID NOs:1, 3, 5, 7, 9, 11, 13, 15, 17, 19, and the complement of such nucleotide sequences; and

(b) amplifying a nucleic acid sequence using the oligonucleotide primer.

16. A method of obtaining a nucleic acid fragment encoding the amino acid sequence encoding a 1-deoxy-D-xylulose 5-phosphate reductoisomerase polypeptide comprising the steps of:

- (a) probing a cDNA or genomic library with an isolated polynucleotide comprising a nucleotide sequence of at least one of 30 contiguous nucleotides derived from a nucleotide sequence selected from the group consisting of SEQ ID NOs:1, 3, 5, 7, 9, 11, 13, 15, 17, 19, and the complement of such nucleotide sequences;
- (b) identifying a DNA clone that hybridizes with the isolated polynucleotide;
- (c) isolating the identified DNA clone; and
- (d) sequencing the cDNA or genomic fragment that comprises the isolated DNA clone.

17. A method for evaluating at least one compound for its ability to inhibit the activity of an isopentenyl diphosphate biosynthetic enzyme, the method comprising the steps of:

(a) transforming a host cell with a chimeric gene comprising a nucleic acid fragment encoding an isopentenyl diphosphate biosynthetic enzyme, operably linked to suitable regulatory sequences;

5 (b) growing the transformed host cell under conditions that are suitable for expression of the chimeric gene wherein expression of the chimeric gene results in production of the isopentenyl diphosphate biosynthetic enzyme encoded by the operably linked nucleic acid fragment in the transformed host cell;

(c) optionally purifying the isopentenyl diphosphate biosynthetic enzyme expressed by the transformed host cell;

10 (d) treating the isopentenyl diphosphate biosynthetic enzyme with a compound to be tested; and

(e) comparing the activity of the isopentenyl diphosphate biosynthetic enzyme that has been treated with a test compound to the activity of an untreated isopentenyl diphosphate biosynthetic enzyme,
15 thereby selecting compounds with potential for inhibitory activity.

18. A composition comprising the isolated polynucleotide of Claim 1.

19. A composition comprising the isolated polynucleotide of Claim 10.

20. An isolated polynucleotide of Claim 1 comprising the nucleotide sequence comprising at least one of 30 contiguous nucleotides of a nucleic sequence selected from the
20 group consisting of SEQ ID NOS:1, 3, 5, 7, 9, 11, 13, 15, 17, 19, and the complement of such sequences.

21. An expression cassette comprising an isolated polynucleotide of Claim 1 operably linked to a promoter.

22. A method for positive selection of a transformed cell comprising:
25 (a) transforming a host cell with the chimeric gene of Claim 5 or an expression cassette of Claim 21; and

(b) growing the transformed host cell under conditions suitable for the expression of the polynucleotide in an amount sufficient to complement a 1-deoxy-D-xylulose 5-phosphate reductoisomerase mutant to provide a positive selection means.

30 23. The method of Claim 22 wherein the plant cell is a monocot (corn, wheat, or rice).

24. The method of Claim 22 wherein the plant cell is a dicot.